



IMPROVE

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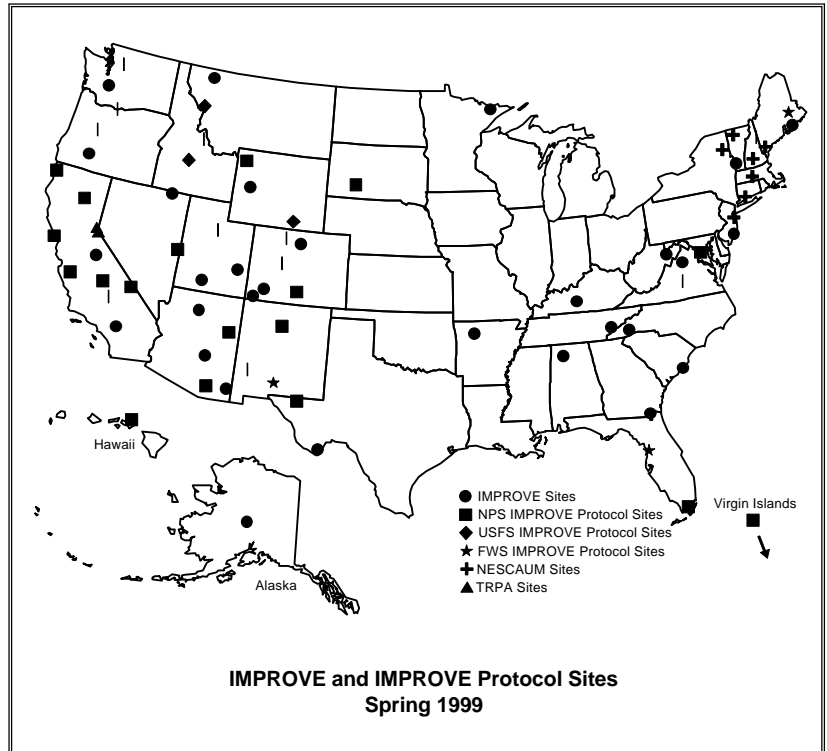
IMPROVE MONITORING UPDATE

Preliminary data collection statistics for the Spring 1999 season (March, April, and May) are:

Data Type	Collection Percentage
Aerosol Data	94%
Optical (transmissometer) Data	95%
Optical (nephelometer) Data	98%
Scene (photographic) Data	73%

Particulate data have been submitted through February 1999 for all measurements including carbon. Seasonal summaries including carbon have been distributed through November 1998. All data through February 1999 are available electronically on the UC-Davis FTP site.

Optical data have been submitted through August 1998 and are available on the CIRA FTP site, at ftp://alta_vista.cira.colostate.edu. Scene data are archived but are no longer routinely reported.



VISIBILITY NEWS....

IMPROVE committee meeting highlights

The IMPROVE Steering Committee met at the Desert Research Institute in Reno, Nevada, June 10-11, 1999. Major discussion topics included the ongoing expansion of the IMPROVE network with about 80 new aerosol monitoring sites, and the creation of Associate Memberships as a means for interested government organizations to participate in the IMPROVE Program. The network expansion is proceeding on schedule and most of the new sites have been identified. Most of the IMPROVE "protocol sites" that are in or near Class I areas have been found to be suitable for the new IMPROVE sites.

The Steering Committee unanimously approved a new category of steering committee membership designated Associate Membership. The purpose of associate membership is to foster additional IMPROVE-comparable visibility monitoring that will aid in understanding Class I area visibility, without upsetting the balance of organizational interests obtained by the steering committee participants. To be an associate

member a government organization must operate at least one monitoring site following IMPROVE protocols and share that data. The Steering Committee unanimously voted to accept the State of Arizona as the first Associate Member.

Monitoring guidance document available

The Environmental Protection Agency (EPA) has released a *Visibility Monitoring Guidance Document*, to assist organizations responsible for collecting visibility and particulate matter data, in designing and implementing monitoring networks. The document includes considerations and recommendations for developing effective visibility monitoring programs. It addresses visibility definitions and theory, monitoring goals and objectives, data quality objectives, monitoring methods, data archive and data applications, and network design. It also describes current visibility measurement methods and protocols, particularly those used in the IMPROVE program. The guidance document can be found on the EPA's website, at:

<http://www.epa.gov/ttn/amtic/visinfo.html>

VISIBILITY NEWS continued on page 6....

Feature Article

EPA issues final regional haze regulations for protection of visibility in Class I areas**Introduction**

On April 22, 1999, the Environmental Protection Agency (EPA) issued final regional haze regulations, which call for states to establish goals for improving visibility in 156 national parks, wilderness areas, and international parks, and to develop long-term strategies for reducing air pollutant emissions that cause visibility impairment. The regulations are expected to have the additional benefit of improving visibility in broad areas nationwide. Without the effects of pollution, a natural visual range is approximately 140 miles in the West and 90 miles in the East. Over the years, however, in many areas of the United States, fine particles have significantly reduced the range that people can see. In the West, the current range is 33-90 miles, and in the East, the current range is only 14-24 miles.

Regional haze obscures visibility -- the clarity, color, texture, and form of what we see. Visibility impairment is one of the most basic indicators of pollution in the air. It occurs as a result of scattering and absorption of light by particles and gases suspended in the atmosphere. Some haze-causing pollutants (mostly fine particles) are directly emitted into the atmosphere. Other haze-causing particles result from chemical reactions of gaseous pollutants in the atmosphere (e.g., sulfate forms from sulfur dioxide, and nitrates form from nitrogen oxides). Pollutant emissions come from a wide range of sources and activities, including electric power generation, industrial and manufacturing processes, automotive emissions, agriculture/forest burning, construction activities, and so on. Some pollutants can be transported hundreds of miles from where they originated, causing regional haze over broad geographic areas. The same particles (sulfates, nitrates, organic carbon, smoke, and soil dust) comprising PM_{2.5}, which are linked to serious health effects and environmental effects (e.g., ecosystem damage), can also significantly degrade visual air quality. Thus, actions to reduce levels of visibility-impairing pollutants will benefit public health and reduce certain adverse effects to the environment.

Background

In the 1977 Clean Air Act, Congress established a national visibility goal as "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I federal areas which impairment results from man-made air pollution." The amendments required the EPA to issue regulations to assure "reasonable progress" toward meeting this national goal. In 1980, the EPA issued regulations that addressed visibility problems that could be "reasonably attributable" to a single or small group of sources. The EPA postponed regulations that addressed regional haze,

however, until improved visibility and air quality monitoring and modeling techniques were developed. At that time, visibility monitoring was just beginning, and both the monitoring techniques and knowledge of the specific pollutants that cause visibility impairment were not well understood.

Congress amended the Clean Air Act again in 1990. The amendments called for additional emphasis on regional haze. The Act required EPA to work with several western states to establish a commission that would address visibility in Grand Canyon National Park. This commission, formed in 1991, was the Grand Canyon Visibility Transport Commission. The Commission delivered its final report to the EPA in 1996, which included technical analyses and broad consensus on strategies to improve visibility in 16 Class I areas on the Colorado Plateau.

In the early '90s, the National Academy of Sciences formed a Committee on Haze in National Parks and Wilderness Areas. The committee's 1993 report, *Protecting Visibility in National Parks and Wilderness Areas*, reviewed the state of the science on visibility. An important conclusion from the report was that "current scientific knowledge is adequate and available control technologies exist to justify regulatory action to improve and protect visibility."

The Act required the EPA to take regulatory action on regional haze regulations within 18 months of receiving the Commission's recommendations. In July 1997, the EPA issued proposed regional haze regulations in conjunction with the issuance of new national ambient air quality standards for PM_{2.5} (or particulate matter less than 2.5 microns in diameter) and ground-level ozone. The proposed haze regulations took into account research and information from numerous sources, including the Commission's recommendations and the NAS report. EPA considered over 1,200 comments on the proposed regulations, and the Agency finalized the regional haze rule on April 22, 1999 (see 64 *Federal Register* 35714; July 1, 1999). Vice President Al Gore and EPA Administrator Carol Browner announced the new regional haze regulations on Earth Day (April 22) from Shenandoah National Park in Virginia.

The regulations and state requirements

The regional haze regulations protect all 156 federal Class I areas on the nation (see Figure 1). Class I areas, defined by the Clean Air Act, include national parks greater than 6,000 acres, wilderness areas and national memorial parks greater than 5,000 acres, and international parks that existed as of August 1977.

Haze Regulations continued on page 4....

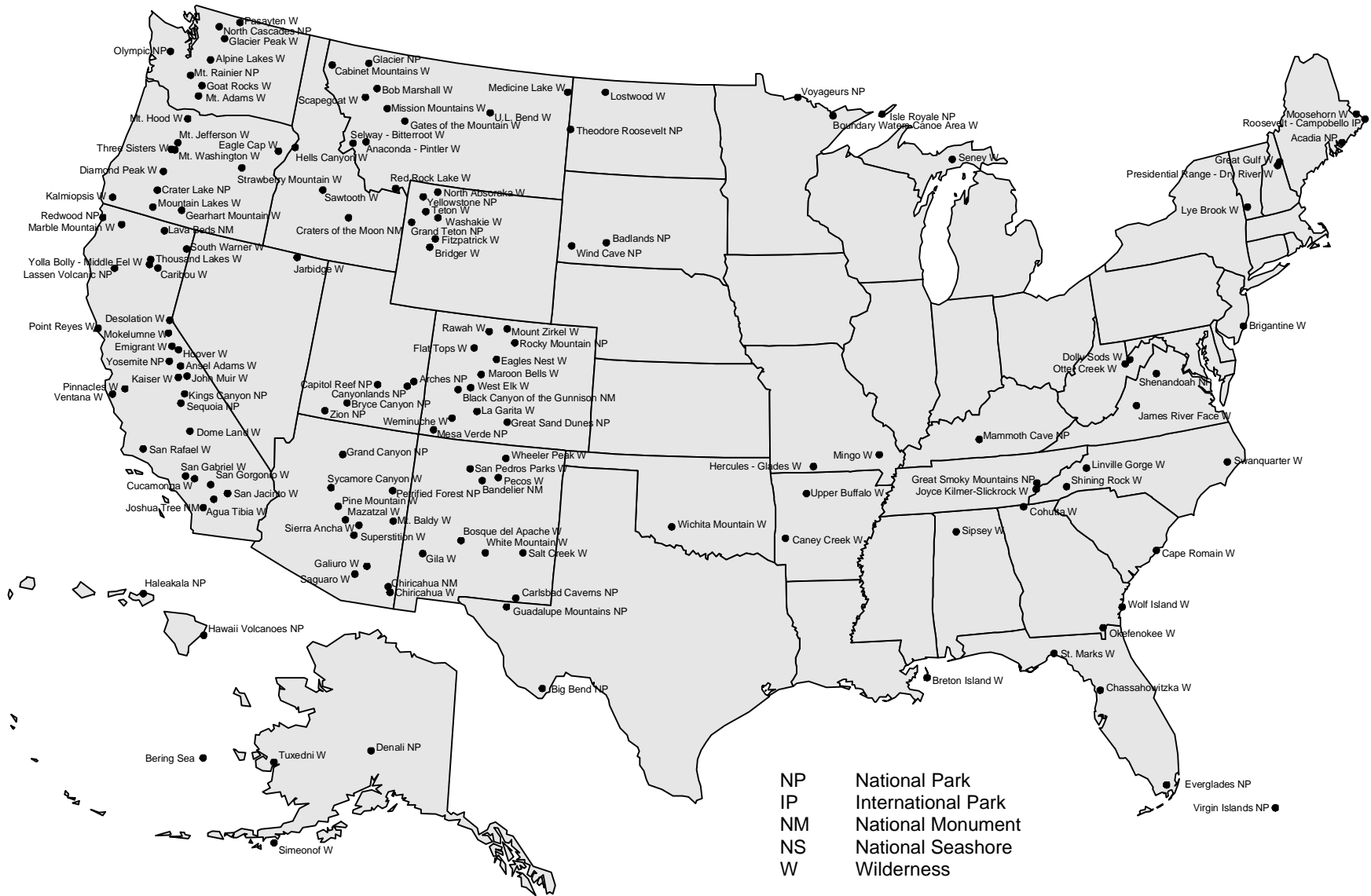


Figure 1. The 156 Class I Areas in the United States.

Haze Regulations continued from page 2....

State and local air quality agencies will implement the regional haze program. The regulations require each state to develop coordinated strategies and implement programs to make reasonable progress toward the goal of “no man-made impairment” in national parks and wilderness areas by reducing emissions that contribute to haze. States will establish reasonable progress goals for improving visibility in each Class I area, taking into consideration the statutory requirements of the Clean Air Act. States are also required to conduct certain analyses, including analyses of improvement rates aimed at reaching natural conditions in 60 years, to ensure that they set ambitious progress goals for Class I areas.

In developing emission reduction strategies, states should address all types of man-made emissions contributing to impairment in Class I areas, including mobile sources, stationary sources, small “area” sources, and prescribed fire. Because regional haze often results from pollution emitted across broad regions, the EPA encourages states to participate in multi-state planning partnerships to develop regional strategies for meeting progress goals. Both the regional haze program and the Clean Air Act require consultation between states and the federal land managers responsible for managing Class I areas. In addition, specific provisions of the regulations allow the states involved in the Grand Canyon Visibility Transport Commission (Arizona, California, Colorado, Idaho, New Mexico, Oregon, Utah, and Wyoming) to implement many of the commission’s recommendations within the framework of the national regional haze program.

One of the principal elements of visibility protection provisions in the Clean Air Act is the requirement for installation of best available retrofit technology (BART) for certain existing sources placed into operation between 1962 and 1977. The regional haze regulations require three basic state plan elements related to BART: 1) a list of sources eligible for BART, 2) an analysis of emission reductions and changes in visibility that would result from “best retrofit” control levels on sources subject to BART, and 3) BART emission limits for each subject source, or an alternative program (such as an emission trading program) for achieving greater “reasonable progress” than implementation of source-by-source BART controls.

Initial state plans for regional haze will be developed in the 2003-2008 timeframe. States choosing to implement the Commission’s recommendations will submit implementation plans in 2003. The timetable for states not implementing the Commission’s recommendations follows the timetable for EPA’s designation of the attainment status for the PM_{2.5} national ambient air quality standards. For areas that EPA designates as

“attainment” or “unclassifiable” for PM_{2.5}, states will be required to submit regional haze state implementation plans (SIPs) to EPA within one year (generally 2004 to 2006). For areas that EPA designates as “nonattainment” for PM_{2.5}, states will be required to submit regional haze SIPs within 3 years (generally 2006 to 2008). States can submit statewide regional haze implementation plans at the same time that PM_{2.5} nonattainment plans are due if they first commit to participation in multi-state regional planning efforts.

Subsequent revisions for SIPs are required in 2018 and every 10 years thereafter. States must also submit progress reports to the EPA every 5 years. In these reports, states will compare current visibility conditions to baseline conditions (the average conditions during the years 2000 to 2004), describe changes in emissions of visibility-impairing pollutants, and include any mid-course corrections to management strategies.

Costs and benefits

Costs and benefits of the regulations have been estimated for a range of visibility improvement levels, but ultimately will depend on the specific visibility improvement goals and strategies each state decides to implement. Costs are estimated at \$1 billion to \$4 billion annually for the first 10 years (generally 2008 through 2018). Benefits are estimated to be \$3.5 billion to \$10.8 billion annually for the same period. Both the environment and public health are expected to benefit from reducing levels of visibility-impairing pollutants.

Visibility monitoring efforts

The EPA is currently expanding the existing Class I aerosol visibility monitoring network from 30 to 110 sites (see Figure 2). This expansion should be completed by the end of 1999. The network will be designed to provide regionally representative coverage and data for all 156 Class I areas. Some sites will represent a “cluster” of Class I areas. The EPA, state air pollution agencies, and federal land managers are working together to design a monitoring network that will be regionally representative for all 156 areas. For more information about the network expansion, see *IMPROVE Newsletter*, Volume 8, Number 1 (April 1999).

For more information

The regional haze regulations and related information are available from EPA’s website at: <http://www.epa.gov/oar/vis/overview.html>, or <http://www.epa.gov/ttn/oarpg/>. In addition, EPA’s Office of Air and Radiation’s homepage contains a wide range of information regarding air pollution programs and issues. Visit the Internet at <http://www.epa.gov/oar/>. For further information about the regulations, contact:

Richard Damberg
EPA Office of Air Quality Planning and Standards
Telephone: 919/541-5592



Figure 2. The 110 Selected Monitoring Clusters and Associated Federal Land Manager.

VISIBILITY NEWS *continued from page 1...*

Northeast states and federal agencies begin real-time digital camera monitoring

by Lee Alter, NESCAUM

In an effort to raise public awareness of regional haze issues in the eastern U.S., several state and federal agencies have recently joined forces to build a network of real-time digital cameras in the Northeast, similar to what has already been accomplished at a site in Great Smoky Mountains National Park. The camera network (CAMNET) will provide images from a combination of urban and rural scenes, including New York, NY; Boston, MA, Acadia National Park, ME; White Mountain National Forest, NH; and the Adirondack Mountains, NY. This approach is expected to underscore the regional nature of air pollution and the value of both urban and rural vistas.

Implementation of the camera network is being coordinated by the Northeast States for Coordinated Air Use Management (NESCAUM), a non-profit association of eight Northeast air pollution control agencies. Project funding and other support is being provided by NESCAUM and the states of Maine, New Hampshire, New Jersey, and New York; the National Park Service; the U.S. Forest Service; and the U.S. Environmental Protection Agency. Contractual support is being provided by Air Resource Specialists, Inc. and Cobalt Multimedia Systems, Inc.

Images from CAMNET will be available on the Internet at <http://hazecam.net> as the network and website construction develops. The website will also provide information on current air pollution levels and meteorological conditions. This information will be used to relate poor visibility to man-made pollutants and to distinguish this from other, predominantly natural causes of poor visibility. Development of the network and website is expected to take several months.

In addition to providing a resource to the general public, CAMNET is also expected to support local outreach efforts including the possible deployment of touch-screen kiosks at Acadia National Park and the Liberty Science Center in New Jersey. For further information, please contact:

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Project MOHAVE final report available

In 1991, a monitoring, modeling, and data assessment study began, to estimate the Mohave Generating Station's contribution to visibility impairment at Grand Canyon National Park, Arizona. The final report of this study has been released, and indicates that the Mohave Generating Station does contribute to visibility impairment at the park, but its emissions are not the major cause of the impairment.

Congress directed the Environmental Protection Agency (EPA) to conduct the study, known as Project MOHAVE (Measurement Of Haze And Visual Effects), in cooperation with the National Park Service and the majority owner of the Mohave Generating Station, Southern California Edison Co. The generating station, in Laughlin, Nevada, is a 1580 megawatt coal-fired power plant, located approximately 75 miles southwest of the Grand Canyon. It emits up to 40,000 tons of sulfur dioxide (SO₂) each year, and is one of the largest sources of SO₂ in the West.

The EPA will review the project's findings and other information to determine the magnitude and frequency of visibility impairment that is attributable to the generating station. The final report is available on the EPA website at:

<http://www.epa.gov/region09/air/mohave.html>

IMPROVE trends report underway

The third IMPROVE data analysis report of spatial and seasonal patterns and haze composition in the United States is due to be completed this coming winter. This report, produced by the Cooperative Institute for Research in the Atmosphere (CIRA) will update the spatial and seasonal trends presentations that were presented in the previous reports with current data, and include new eastern sites that have accumulated at least three years of data. The report will also compare IMPROVE data with data from other networks, and review distributions of aerosol concentrations with the goal of better describing current good "best 20%" aerosol conditions and "natural" background conditions. A future issue of the IMPROVE Newsletter will feature findings of the report. For more information about the report, contact:

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A change of perspective

by Bruce Polkowsky, NPS

Most of the IMPROVE community may now know, but some thought I should "make it official." I have changed jobs from the U.S. EPA to the National Park Service. I worked for the EPA since May 1977, starting in North Carolina, with a short time in Region 9 (San Francisco) during graduate studies, then back in North Carolina.

I began working on visibility issues after the 1980 rules were promulgated and EPA was sued to implement them since the states, for the most part, had not acted on them. It was this litigation and EPA's actions to respond to, that provided for the birth of the IMPROVE monitoring network. Since that time, EPA has always promised to supplement the 1980 rules to address regional haze. My work at EPA had been associated with implementing the 1980 rules and working toward the issuance of the regional haze rules announced in April of this year. Developing the technical foundation, part of which is the large database that IMPROVE has accumulated through the years, and helping EPA management understand visibility issues were my main duties. During the development of the final regional haze regulation, I felt I would enjoy a new perspective on my work. I was looking for a change that would allow me to see how the new regulation would affect a land management agency. Working with my friends at the National Park Service was the perfect fit.

In many ways I am still connected with EPA, and look forward to working with my former agency, as well as states and the private sector, on a solution to challenges of implementing the rule. How to define "natural conditions," the appropriate first long-term strategy goals, and the technical issues of tracking regional conditions will keep everyone busy for quite some time. I can be contacted at:

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Mt. Zirkel and the Hayden Station's Retrofit

by Dan Ely, State of Colorado

The U.S. Forest Service (USFS) concluded in its July 1993 certification of visibility impairment letter to the State of Colorado, that visibility impairment may have existed in the Mt. Zirkel Wilderness Area, and that local existing stationary sources, the Craig and Hayden power stations, contributed to the problem. This preliminary conclusion was made, in part, based on data from IMPROVE protocol monitoring conducted near the wilderness area. The Mt. Zirkel Visibility Study was developed collaboratively between interested parties to collect additional information. The study was funded by the owners of Craig and Hayden, and jointly managed by the State of Colorado, the owners of Craig and Hayden, and the USFS. The Environmental Protection Agency (EPA) provided technical advice throughout the study process, which was completed July 15, 1996.

By law, if visibility impairment can be reasonably attributed to existing stationary sources, a Best Available Retrofit Technology (BART) analysis must be conducted, and may result in emission limitations. At this time Colorado has not used the information to make a decision regarding Hayden or Craig. Nevertheless, the certification regarding Hayden has been resolved.

The groundwork for resolution of Hayden occurred when the Sierra Club, the State of Colorado, the owners of Hayden Station, and the EPA/Department of Justice executed the Hayden Consent Decree in May 1996. The Decree is intended to resolve a number of issues, including a successful Sierra Club lawsuit against the Hayden Station, the state's visibility regulatory program in relation to Hayden, and an EPA complaint against the facility. In addition, the Decree is intended to make progress toward reducing acid deposition in the Mt. Zirkel Wilderness Area. Colorado believes the significant emission reductions (85% SO₂, 40%-60% NO_x, and new baghouses for particulate) will effectively eliminate visibility impairment in the wilderness area that could be associated with the Hayden Station. The state further believes that the Hayden Consent Decree effectively resolves the certification of impairment brought by the USFS against Hayden Station. The USFS has agreed that its complaint against Hayden has been satisfied.

Since then, the owners of Hayden (Public Service Company of Colorado, Salt River Project, and PacifiCorp) have been busy retrofitting the two units with new control equipment. The NO_x, SO₂, and particulate control systems for Unit #1 were tied-in during an outage in the fall of 1998 and the unit started up in December. Flue gas exiting Unit #1's boiler was routed to the new baghouse and for one to two weeks the baghouse was "cured" -- gradually each compartment within the baghouse and the bags within each compartment developed a layer of ash to allow the bags to effectively capture the coal ash. Also during this time, flue gas was routed through the new lime spray dryer to reduce SO₂. NO_x controls were built into the boiler via low-NO_x burners. The system for Unit #2 commenced its tie-in during an outage in the spring of 1999.

While it is too early to see results, it is important to track the effect of the emission reductions on acid levels in the snowpack, and SO₂ concentrations and visibility impairment near the Mt. Zirkel Wilderness Area. Funding for and the collection of these data are provided by the USFS (via funding of the IMPROVE protocol site at Mt. Zirkel), the US Geological Survey, EPA, and the State of Colorado. For more information, contact:

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IMPROVE Steering Committee members represent their respective agencies and meet periodically to establish and evaluate program goals and actions. IMPROVE-related questions within agencies should be directed to the agency's Steering Committee representative. Steering Committee representatives are:

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